



October 29, 2015

Congressional Committees

Space Acquisitions: GAO Assessment of DOD Responsive Launch Report

This report formally transmits a briefing, with updated information, that we originally sent to congressional defense committees on August 18, 2015. The National Defense Authorization Act (NDAA) for Fiscal Year 2014 (Pub. L. No. 113-66, § 915 (2013)), included a provision for GAO to provide an assessment of the Department of Defense's (DOD) responsive launch report within 60 days of issuance.¹ We updated the information in the briefing to reflect the final results of our work. The NDAA for fiscal year 2014 directed the DOD Executive Agent for Space (EA for Space) to provide in its report, a study of

1. existing and past operationally responsive, low-cost launch efforts by domestic or foreign governments or industry;
2. conditions or requirements for responsive launch that would provide the necessary military value;
3. various methods to develop an operationally responsive, low-cost launch capability; and
4. viability of greater utilization of innovative methods.

Additionally, the NDAA for fiscal year 2014 directed the EA for Space to provide a consolidated plan for developing an operationally responsive, low-cost launch capability within DOD. The EA for Space office reported the results of its study to the congressional defense committees in June 2015.² This report discusses: (1) the extent to which DOD's report addresses the information called for in the NDAA for fiscal year 2014, and (2) the challenges, if any, DOD may face as it pursues a responsive launch capability.

To assess the extent to which the DOD's June 2015 operationally responsive low-cost launch report addresses the information called for in the NDAA for fiscal year 2014, we reviewed the report and compared it to information called for in the NDAA for fiscal year 2014, interviewed officials from the EA for Space office and discussed the data and approach used to develop the report and its findings. To identify any challenges DOD may face as it pursues responsive launch options, we interviewed DOD officials from the EA for Space office, Air Force Space Command, the Office of the Secretary of Defense's Cost Assessment and Program Evaluation office, U.S. Strategic Command (USSTRATCOM), and contractor personnel from two

¹The term "responsive launch" generally means the ability to launch space assets to their intended orbits as the need arises, possibly to augment or reconstitute existing space capabilities.

²Department of Defense, United States Air Force, *Operationally Responsive, Low-Cost Launch (ORLCL) Congressional Report, Report to Congressional Committees* (June 2015).

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commercial companies that are working to develop responsive launch capabilities. We also identified and reviewed requirements for operationally responsive space capabilities from defense program concepts of operations, and programmatic and policy documents.

We conducted this work from July 2015 to October 2015 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

In summary, we found that DOD's June 2015 report generally addresses four of the five elements called for in the NDAA for fiscal year 2014, including descriptions of:

- existing and past operationally responsive launch efforts, in addition to some criteria for considering launch costs;
- existing launch requirements and the need for validated requirements for responsive launch;
- various government and commercial efforts to develop an operationally responsive, low-cost launch capability; and
- innovative methods that could contribute to launch responsiveness.

DOD's report does not, however, include a consolidated plan for developing a responsive launch capability. DOD attributes this omission to a lack of formal requirements for responsive launch, stating that no existing space program has them. DOD officials told us that requirements are premature without a validated need for responsive launch. USSTRATCOM officials added that responsive launch needs cannot be well defined at this time due to uncertainties in the threat environment, and stated that DOD will validate future responsive launch requirements once it acquires new information from intelligence and defense studies presently underway. In lieu of a consolidated plan, the DOD report calls for reassessments of responsive launch needs and national security space program architectures, to help clarify requirements, and to take advantage of emerging responsive launch options.³ DOD's June 2015 report also outlines numerous efforts within DOD intended to develop or demonstrate a capability for responsive launch. For example, three DOD offices were executing five concurrent responsive launch programs, all designed to carry small class payloads to the same orbit.⁴ DOD officials told us that these concurrent programs were not duplicative, however, as the offices were pursuing different objectives.⁵

DOD and contractor officials we spoke with highlighted several potential challenges DOD faces as it pursues operationally responsive launch capabilities. For example, DOD officials told us that existing national security space program architectures (including payloads, ground systems, user equipment, and launch systems) may need to be modified to improve responsiveness,

³The DOD report did not include a timeframe for when these reassessments should occur.

⁴The three DOD offices (and their respective programs) described in DOD's June 2015 report were: (1) the Defense Advanced Research Projects Agency (Airborne Launch Assist Space Access and Experimental Spaceplane); (2) the Air Force's Operationally Responsive Space office (ORS-4 Super Strypi); and (3) the Army's Space and Missile Defense Command (Soldier-Warfighter Operationally Responsive Deployer for Space and Multipurpose NanoMissile System). Each of these efforts was designed to carry small-class payloads of 660 lbs. or lighter to Low Earth Orbit.

⁵GAO plans to assess this issue in further detail as part of its annual assessment of fragmentation, overlap and duplication.

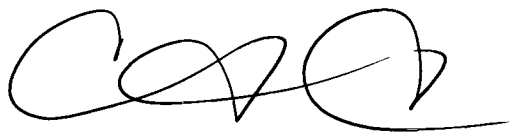
which could present challenges. That is, modifying one program could have repercussions for another, including changes to infrastructure and command and control elements. Further, while smaller, simpler satellites may require less time and effort to develop, build, and launch, a larger number of satellites may be needed to provide the same level of capability, and the transition from existing system designs could increase costs. Also, DOD currently lacks requirements for responsive launch, but plans to validate future responsive launch requirements as it gains knowledge about emerging threats. Once DOD defines its responsive launch needs and validates future requirements, having a single focal point for prioritizing and developing its responsive launch capabilities will be important. For additional information on the results of our work, see enclosure I.

Agency Comments

We are not making any recommendations in this report. We provided a draft of this report to DOD for comment. DOD's comments are reproduced in enclosure II. In its comments on this report's assessment, DOD found our results to be technically accurate.

We are sending copies of this report to the appropriate congressional committees, the Secretary of Defense, the Secretary of the Air Force and other interested parties. This report is also available at no charge on the GAO website at <http://www.gao.gov>.

Should you or your staff have questions about this report, please contact me at (202) 512-4841 or at chaplainc@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report were Art Gallegos, Assistant Director; Emily Bond, Claire Buck, Keith Hudson, John Krump, and Hai Tran.



Cristina T. Chaplain
Director
Acquisition and Sourcing Management

Enclosures – 2

List of Committees

The Honorable John McCain
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The Honorable Jack Reed
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Committee on Armed Services
United States Senate

The Honorable Thad Cochran
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The Honorable Pete Visclosky
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Committee on Appropriations
House of Representatives



GAO Assessment of DOD Responsive Launch Report

**Briefing to the Congressional Defense
Committees in response to the National Defense
Authorization Act for Fiscal Year 2014 (Pub. L. No.
113-66, § 915 (2013))**

Page 1

Contents

- Introduction
- Objectives
- Background
- Objective 1 GAO Assessment of DOD Responsive Launch Report
- Objective 2 Challenges DOD May Face in This Area
- Scope and Methodology
- DOD offices and contractors interviewed

Introduction

- U.S. Strategic Command (USSTRATCOM) has identified specific needs that could be addressed in part by the development of operationally responsive space capabilities, including the ability to rapidly
 - augment existing space capabilities,
 - replenish critical capabilities, and
 - exploit new technological innovations.
- As directed by the National Defense Authorization Act (NDAA) for fiscal year 2014, the DOD Executive Agent for Space office reported in June 2015 on past and present operationally responsive launch options.

Introduction, cont.

The NDAA for fiscal year 2014 directed the DOD Executive Agent for Space to provide the following:

1. The results of its study and assessment of
 - a) existing and past operationally responsive, low-cost launch efforts by domestic or foreign governments or industry;
 - b) conditions or requirements for responsive launch that would provide the necessary military value;
 - c) various methods to develop an operationally responsive, low-cost launch capability; and
 - d) viability of greater utilization of innovative methods.
2. A consolidated plan for development within DOD of an operationally responsive, low-cost launch capability.

Objectives

This briefing satisfies the provision in section 915 of the NDAA for fiscal year 2014, for GAO to assess DOD's responsive launch report and addresses the following questions:

- (1) To what extent does DOD's report address the information called for in the NDAA for fiscal year 2014?
- (2) What challenges, if any, may DOD face as it pursues a responsive launch capability?

Background

- DOD has historically relied on the Evolved Expendable Launch Vehicle program's medium and heavy launch vehicles to place its national security space payloads into desired orbits. These vehicles have typically taken 2-3 years from initial order to launch date, to conduct production, integration and other mission-specific activities.¹
- The term "responsive launch" generally means the ability to launch space assets (such as satellites and payloads) to their intended orbits as the need arises, possibly to augment or reconstitute existing space capabilities.
- DOD recently studied potential options to achieve shorter time frames from order to delivery of launch vehicles, in the interest of satisfying mission needs as they arise. This approach is known as "launching on demand."
- Launching on demand is considered responsive because it facilitates the delivery of assets to space on a shorter time line than has historically been available.

¹ Given an available supply chain, medium launch vehicles have typically taken 2 years from initial order to launch date, while heavy vehicles have typically taken 3 years.

Background, cont.

- There are a number of efforts underway within DOD to develop or demonstrate responsive launch capabilities; for example, each of the following entities within DOD are currently working on programs to demonstrate responsive launch:
 - the Defense Advanced Research Projects Agency (DARPA),
 - the Air Force's Operationally Responsive Space (ORS) office, and
 - the Army's Space and Missile Defense Command (SMDC).
- At this time, none of these efforts is positioned to move from development and demonstration to production and fielding.



Objective 1: DOD report generally addresses four of the five elements called for in the NDAA for fiscal year 2014

DOD's June 2015 report provides the results of its study on responsive, low-cost launch, including descriptions of

- existing and past operationally responsive launch efforts, and offers various criteria for considering launch costs,
- existing launch requirements and the need for validated requirements for responsive launch,
- various government and commercial efforts to develop an operationally responsive, low-cost launch capability, and
- innovative methods that could contribute to launch responsiveness.

Objective 1: DOD report does not provide a plan for developing a responsive launch capability, as called for in the NDAA for fiscal year 2014

- DOD's June 2015 report does not provide a consolidated plan for developing a responsive launch capability, though it addresses the other four items called for in the NDAA for fiscal year 2014.
 - The report cites the lack of formal requirements for responsive launch as a limiting factor, stating that no existing space programs have them. DOD officials told us that requirements are premature without a validated need for responsive launch.
 - In concert with the report, USSTRATCOM officials said responsive launch needs cannot be well defined at this time due to uncertainties in the threat environment.
 - They said that needs will be based on evolving and emerging threats to space enterprise systems and DOD will validate future responsive launch requirements once it acquires new information from intelligence and defense studies underway.
- In lieu of a consolidated plan, the DOD report calls for reassessment of
 - responsive launch needs to help clarify requirements, and
 - national security space program architectures to take advantage of emerging responsive launch options.²

² The DOD report did not include a time frame for when these reassessments should occur.

Objective 1: DOD report describes multiple development efforts within the department

The report outlines numerous efforts within DOD intended to develop or demonstrate a capability for responsive launch. For example, the following three DOD offices were executing five concurrent responsive launch programs, all designed to carry small class payloads to the same orbit:³

DARPA

- Airborne Launch Assist Space Access
- Experimental Spaceplane

Air Force

- ORS-4 Super Strydi

Army SMDC

- Soldier-Warfighter Operationally Responsive Deployer for Space
- Multipurpose NanoMissile System

DOD officials told us that the concurrent efforts are not duplicative, as the offices are pursuing different objectives, such as launching payloads by air or rail.⁴

³ Each of the above-listed efforts was designed to carry small class payloads of 660 lbs. or lighter to Low Earth Orbit.

⁴ GAO plans to assess this issue in further detail as part of its annual assessment of fragmentation, overlap and duplication.

Objective 2: Potential challenges to developing a responsive launch capability within DOD

- DOD officials told us that existing national security space program architectures (including payloads, ground systems, user equipment, and launch systems) may need to be modified to improve responsiveness, which could present challenges. For example
 - modifying one program could have repercussions for another, including changes to infrastructure and command and control elements
 - smaller, less complex satellites may require less time and effort to develop, produce, and launch, but a larger number of satellites may be needed to provide the same level of capability, and the transition from existing system designs could increase costs;
 - ground systems may need costly modifications to incorporate data processing activities for new payloads or sensors, or to support the increase in the number of satellites; and
 - orbital check out and testing processes are tailored to individual payloads, so if significant changes in satellite constellations are needed, additional technological and operational complexities could arise.
- DOD currently lacks formal requirements for responsive launch, but plans to validate future responsive launch requirements as it gains knowledge about emerging threats.
 - Once DOD defines its responsive launch needs and validates future requirements, having a single focal point for prioritizing and developing its responsive launch capabilities will be important.

Objective 2: Potential challenges, cont.

An ever-changing threat environment may present challenges to developing a responsive launch capability. For example,

- the definition of what “responsiveness” is may shift and
- the business case for whether to maintain a responsive launch capability may vary depending on likelihood of mission failure or adversary attack.

Scope and Methodology

- To assess the extent to which the DOD's June 2015 operationally responsive low-cost launch report addresses the information called for in the NDAA for fiscal year 2014, we reviewed the report, interviewed officials from the Executive Agent for Space (EA for Space) office, and discussed the data and approach used to develop the report and its findings.
 - To identify the potential challenges DOD may face as it pursues responsive launch options, we interviewed DOD officials from the EA for Space office, Air Force Space Command, the Office of the Secretary of Defense's Cost Assessment and Program Evaluation office, U.S. Strategic Command, and contractor personnel from two commercial companies that are working to develop responsive launch capabilities. We also identified and reviewed requirements for operationally responsive space capabilities from defense program concepts of operations, and programmatic and policy documents.
 - To ensure the accuracy and completeness of the information in these slides, we incorporated DOD's technical comments as appropriate.
-

DOD offices and contractors interviewed

- DOD Executive Agent for Space office
- Air Force Space Command
- Air Force Advanced Systems and Development Directorate
- Office of the Secretary of Defense, Cost Assessment and Program Evaluation
- U.S. Strategic Command
- Lockheed Martin
- Orbital ATK



**DEPARTMENT OF THE AIR FORCE
WASHINGTON DC**

22 OCT 2015

Principal DoD Space Advisor Staff (PDSAS)
1670 Air Force Pentagon
Washington DC 20330-1670

Ms. Cristina Chaplain
Director, Acquisition and Sourcing Management
U.S. Government Accountability Office (GAO)
441 G Street NW
Washington DC 20548

Dear Ms. Chaplain:

This is the Department of Defense (DoD) response to the GAO Draft Report, GAO-16-156R, "SPACE ACQUISITIONS: GAO Assessment of DOD Responsive Launch Report," dated October 13, 2015 (GAO Code 121288).

On behalf of the DoD, the Principal DoD Space Advisor Staff appreciates the opportunity to review and comment on the GAO's assessment of the Operationally Responsive, Low-Cost Launch Report to Congress, dated 12 June 2015. We have considered your assessment, and find it to be technically accurate and have no further comment.

We sincerely value the dialogue our office has conducted with your staff over this very important and time-sensitive effort. Also, we highly commend the cordial and professional efforts of the GAO's technical lead, Ms Claire Buck.

If you have any questions, please contact Colonel Greg Wood, PDSAS-8, at 703-693-2359 or gregory.e.wood3.mil@mail.mil.

Sincerely,

A handwritten signature in black ink, appearing to read "DAVID A. HARDY", is positioned above the printed name.

DAVID A. HARDY
Deputy Director, Principal DoD Space
Advisor Staff

cc:
DoD/IG
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OSD(CAPE)
Joint Staff/J8
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